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## PATENT SPECIFICATION

Convention Date (Germany): Oct. 13, 1928.

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Application Date (in United Kingdom): Oct. 14, 1929. No. 31,188/29.

Complete not Accepted.

### COMPLETE SPECIFICATION.



#### An Improved Device for Spraying Paints and the like.

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I, FRIEDRICH RENTSCH, of Comeniusstrasse 8, Leipzig, C. 1, Germany, a German Subject, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to a process and apparatus for spraying liquid substances, and more particularly viscous substances, such as oil varnishes, oil paints and the like on articles of all kinds and its object is to effect the spraying by means of an atomizer operating with compressed air at a pressure below  $1/4$  atmosphere in a perfect and economical manner.

My invention consists substantially in employing for the atomization heated air at a pressure above atmospheric of 0.05 to 0.25 atmospheres by means of a blower air current of about 1 cubic metre of air per minute whereby viscous substances, such as oil varnishes may be effectively atomized which otherwise with cold air can only be atomized at higher air pressures. My invention also comprises a spraying apparatus so designed that the air heater is formed by an electric heating resistance in such a manner that it is carried by the tube located concentrically in the same axis with the atomizing nozzle, the tube being surrounded by a casing traversed by the spraying air.

My invention consists furthermore in transversely splitting the atomizer device between the air nozzle and the shell of the air gun and keeping the parts together by an annular part of the liquid tube whereby each part may be dismantled by itself for the purpose of facilitating the cleaning. A further feature of my invention is that the supply of varnish to the liquid conveying tube takes place by a radial tube of the ring which together with the paint receptacle is turned around the axis of the atomizer in such a manner that the spraying liquid may be conducted through the same pipe from the bottom or from the top into the liquid conveying tube to the atomizer nozzle.

[Price 1/-]

My invention consists furthermore in screwing into the air nozzle mouthpiece an exchangeable ring adapted to vary the air nozzle sectional area whereby the spraying device may be employed for any atomizing pressure air.

A further object of my invention is to provide apparatus for producing the compressed air for operating the spraying apparatus by means of a small multi-stage turbine blower with at least four turbine blade wheel sets with corresponding step partition walls and which supplies compressed air of about 0.15 at per minute.

A still further object of my invention is to effect the atomization by means of an atomizer twist nozzle and external air jacket. It is already known in connection with atomizer twist nozzles to introduce into them compressed air or to admix it with the air contained in them for the purpose of effecting a finer atomization. A further object of my invention is to atomize to a finer mist the paint or varnish mist ejected under corresponding pressure by known atomizer twist nozzles by means of an air jacket or shell and thus to hold it closely together so that no paint is able to drop out. By my combined atomizing device a considerably increased and improved atomizing effect may be attained. By means of the outer air enclosure any shape may be imparted to the jet and besides the circular jet broad and flat jets may be employed which is impossible with twist nozzles alone.

My invention is applicable to all devices in which the atomization of the liquid is effected by compressed air as well as to devices in which the atomization of the liquid takes place mechanically.

Some embodiments of my invention are illustrated by way of example in the drawings affixed to my specification. In the drawings is:—

Figure 1, a hand spraying device in longitudinal section.

Figure 2, a complete spraying apparatus with means for producing compressed air, and

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5/4-32. 0d.

Figure 3, an atomization by means of an atomizer twist nozzle and air jacket.

Referring to Figure 1 of the drawings 20 is the nozzle from which issues the liquid to be sprayed. This nozzle 20 forms the termination of a tube 11 to which the air is supplied from the vessel 18 by a pipe 19. The tube 11 contains the needle valve 21 for regulating the quantity of liquid issuing from the nozzle 20 and which is held closed by the spring 24. The tip of the needle 21 is exchangeable and screwed into the rear portion 22 of the needle. In this way the advantage is obtained that when exchanging the paint nozzles the complete needle need no longer be taken out of the apparatus. The tension of the spring 24 may be varied by means of the nut 23. On the needle 20 is fixed the head 34 by means of the clamping screw 26. The head 34 is connected with the trigger 25 by pivoted links so that the needle valve may be opened by the lever 25. The stop screw 27 limits the opening movement of the paint nozzle 20. The tube 11 is surrounded by the tubular housing 12 which is screwed to the rim 10 connected with the tube 11 by three webs so that the tube 11 and the jacket may easily be separated from each other. At the back the housing terminates into a handle in which a hose 2 may be secured by means of a bayonet joint 3 or any other suitable fastening device. The other end 35 of this hose is joined to a suitable blower, such as a vacuum cleaner. To the rim 10 is furthermore attached by means of a bayonet joint or the like the head 4 forming the continuation of the housing 12 and with which the front nozzle head 6 is connected by screw thread or in any other suitable manner. The atomizing air flows from the hose 2 through the handle 1 and the housing or box 12 as well as the head 4 into the nozzle head 6. The head 6 may be turned in relation to the part 4 according to whether it is desired to produce a flat jet or a circular jet and is locked in its position by the counter ring 9. In the position of the head 6 shown in the drawings in which a flat jet is formed the air from the head 4 is able to pass through four openings 5 into ducts in the head 6 into the outlets of which are screwed rings 8. The flat jet effect is determined by the width of the openings of the rings 8 and may be regulated by changing the rings. If it is desired to produce a circular jet the head 6 is turned in such a manner that the openings 5 are closed. The air is therefore only able to issue through the opening of the ring 7 screwed into the head 6 and by changing this ring 7 the formation of the circular jet may be regulated for any air pressure.

Instead of using removable rings 7 and 8 a nozzle head with outlet openings of a definite size may be employed and this nozzle head may then be exchanged by a head of different size.

In the housing 12 is located the removable electric heating element 14 surrounding the tube 11 and which receives current through the plug 13 on the angle piece 36. In the tube 11 there is also located a plug 16 through which current is led to the heating element and carries a switch 15 by means of which the heating element as well as the electric motor driving the blower may be switched on or off.

The receptacle 18 containing the liquid may be replaced by a supply pipe issuing from a large receptacle or tank.

The receptacle 18 for the liquid is detachably connected with the threaded branch 33 by a nut 32. A channel in the cover 31 of the receptacle 18 leads to a cock 17 provided on the blower 12 and by means of which air is introduced into the receptacle 18 which forces the liquid to be sprayed out of the receptacle. From this channel branches a heating pipe 30 coiled around the receptacle 18 and adapted to heat the content of the receptacle. A hook 28 serves for suspending the entire apparatus from any overhead structure. The projection 29 facilitates the handling of the apparatus by hand.

Figure 2 of the drawings illustrates a preferred combination of a complete spray plant with a spraying apparatus of the type described.

The spraying apparatus is by means of a hose 2 connected with a small multi-stage turbine blower 37 which is driven by a universal electric motor 38 of about 1/2 HP capacity. The blade wheels of the turbine may be mounted directly upon the motor shaft. The number of compression stages of the turbine wheels separated from one another by partition walls is at least four. The speed of the turbine amounts to about 12,000 revolutions per minute. It has been ascertained that by the aid of such a turbine arrangement it is possible to put the quantity of air of approximately 1 cbm. per minute necessary for operating the sprayer under a pressure of approximately 0.15 at. with the very low expenditure of power of about 1/2 HP.

The air is drawn in through the air sieve or filter 39 which is so arranged that the air is able to enter from below or in such a manner that any descending fog of paint is not drawn into the machine. The sieve or filter is joined to the cover 40 by a bayonet joint. To the cover is attached a dust collecting bag 41 which keeps the atomizing air free from dust. The cover 130

40 is mounted by means of a ring 42 which facilitates the removal of the cover for the purpose of cleaning or employing the dust collecting bag 41.

5 The blower and the motor are mounted on three rollers or wheels 43 which enable the machinery to be dragged about on the floor to follow the spray nozzle. If it is, however, desired that the apparatus should be stationary the wire 44 is suspended in the hole 45 of one roller. Instead of the rollers, slides and the like may be provided. If the handle 46 is provided with suitable straps the whole machinery may be carried on the back of the operator, with or without the aid of a suitable cradle.

It will be understood that the blower might be driven by an internal combustion motor which could be cooled by the compressed air produced by the turbine blower, the heat of the exhaust gases of the motor being utilized for heating the atomizing air and increasing its pressure.

25 The electric motor 38 receives current by the cable 47 provided with plugs at both ends. The switching in of the motor is effected by a tumbler switch 48 or any other suitable switch.

30 Figure 3 of the drawings illustrates a preferred construction of the spray nozzle with twisted passage and air jacket. In this nozzle a closing member 49 is preferably connected with the liquid tube 11, instead of the liquid nozzle in Figure 1, for the purpose of covering the tip 21 of the nozzle needle. On to this covering member 49 is screwed the customary atomizer twist nozzle 50 with an atomizer insertion piece 51 with corresponding twisted channels or the like. In this way the result is obtained that the spraying liquid supplied by means of a hose through the threaded branch 33, and which by means of a pump or the like is placed under any desired high pressure is expelled through the helical passages without air atomization when the tip of the nozzle needle 21 is withdrawn through the opening of the closing piece 49 into the atomizer twist nozzle 50. To the atomizing jet thus issuing without air atomization a large quantity of low pressure atomizing air is applied externally along the entire circumference within the housing of the air nozzle whereby a finer atomization is attained and the fog of paint is closely confined, which by means of the nozzle head 6 the jet may be given any desired form for broad or circular spraying.

It will be understood that the structure of the apparatus may be modified in various ways familiar to those skilled in the art without departing from the spirit of my invention or the ambit of the

appended claims.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. The process of spraying viscous liquids, such as oil varnishes, oil paints and the like by means of compressed air of 0.05 to 0.25 at. pressure, which consists in heating the atomizing air on its way to the spray nozzle.

2. The process of spraying viscous liquids, such as oil varnishes, oil paints and the like by means of compressed air of 0.05 to 0.25 at. pressure, which consists in heating the atomizing air on its way to the spray nozzle, a multi-stage small turbine blower of at least four turbine blade wheels with interposed partition walls being employed for producing the atomizing compressed air, said blower running with about 12,000 revolutions per minute and delivering 1 cbm. atomizing air of about 0.15 at. per minute.

3. The process of spraying viscous liquids, such as oil varnishes, oil paints and the like by means of compressed air of 0.05 to 0.25 at. pressure, which consists in heating the atomizing air on its way to the spray nozzle, the atomization taking place by setting the spray liquid itself under a correspondingly high pressure and ejecting it atomized by means of an atomizer twist nozzle and adding to the atomizer jet ejected without air atomization along its entire outer circumference low pressure atomizing compressed air, for the purpose of finer atomization of the liquid and closer confinement of the fog of paint as well as for giving the jet any desired shape.

4. The process of spraying viscous liquids, such as oil varnishes, oil paints and the like by means of compressed air of 0.05 to 0.25 at. pressure, which consists in heating the atomizing air on its way to the spray nozzle, a multi-stage small turbine blower of at least four turbine blade wheels with interposed partition walls being employed for producing the atomizing compressed air, said blower running with about 12,000 revolutions per minute and delivering 1 cbm. atomizing air of about 0.15 at. per minute, the atomization taking place by setting the spray liquid itself under a correspondingly high pressure and ejecting it atomized by means of an atomizer twist nozzle and adding to the atomizer jet ejected without air atomization along its entire outer circumference low pressure atomizing compressed air, for the purpose of finer atomization of the liquid and closer confinement of the fog of paint as well as for

giving the jet any desired shape.

5. Spraying apparatus, comprising an electric heating resistance located within the sprayer housing, and a tube adapted to carry said resistance and arranged concentrically to the axis of the atomizer nozzle.

6. Spraying apparatus, comprising an electric heating resistance located within the sprayer housing, and a tube adapted to carry said resistance and arranged concentrically to the axis of the atomizer nozzle, said apparatus having a transverse joint between the air nozzle and the shell, and an annular portion of said tube adapted to keep the two parts of the apparatus together.

7. Spraying apparatus, comprising an electric heating resistance located within the sprayer housing, and a tube adapted to carry said resistance and arranged concentrically to the axis of the atomizer nozzle, said apparatus having a transverse joint between the air nozzle and the shell, and an annular portion of said tube adapted to keep the two parts of the apparatus together, the supply of paint to said tube taking place through the radial tube of said ring.

8. Spraying apparatus, comprising an electric heating resistance located within the sprayer housing, and a tube adapted to carry said resistance and arranged concentrically to the axis of the atomizer nozzle, said apparatus having a transverse joint between the air nozzle and the shell, and an annular portion of said tube

adapted to keep the two parts of the apparatus together, the supply of paint to said tube taking place through the radial tube of said ring, said ring together with the paint receptacle being adapted to be rotated around the axis of the sprayer in such a manner that the spraying liquid may be introduced into said axial tube by the same pipe from the bottom or from the top.

9. Spraying apparatus, comprising an electric heating resistance located within the sprayer housing, and a tube adapted to carry said resistance and arranged concentrically to the axis of the atomizer nozzle, said apparatus having a transverse joint between the air nozzle and the shell, and an annular portion of said tube adapted to keep the two parts of the apparatus together, the supply of paint to said tube taking place through the radial tube of said ring, said ring together with the paint receptacle being adapted to be rotated around the axis of the sprayer in such a manner that the spraying liquid may be introduced into said axial tube by the same pipe from the bottom or from the top, and an exchangeable tip ring screwed into the air nozzle mouth-piece for the purpose of varying the air nozzle cross-section for any pressure of the atomizing air.

Dated this 14th day of October, 1929.

PHILLIPSS,

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